COMBUSTION WEBINAR

E-fuels: A pathway to achieve 2030 CO_2 horizon

Speaker: Antonio Garcia Martinez, Universitat Politècnica de València, Spain

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Biography: Antonio García is an Associate Professor in the Department of Thermal and Reciprocating Engines at the Universitat Politècnica de Valencia, where he develops his teaching responsibilities in the framework of combustion fundamentals. During the last years, his research activities have been focused on Low-Temperature Combustion topics. In particular, an extensive research work on the use of high-efficiency premixed combustion strategy using two-fuels with different auto-ignition characteristics in CI engines. This effort has led to the publication of more than 90 peer-reviewed articles, being an active member in SAE, acting as session organizer, reviewer and author at different events. He received his M.S. and Ph.D. in Mechanical Engineering from the Universitat Politècnica de València. Professor Garcia has been a visiting professor at the Combustion Engines division at Lund University, as well as a visiting researcher at RWTH Aachen University, where he developed relevant works on the implementation of advanced combustion systems on CI engines. In addition, Antonio is Editor in Chief of Results in Engineering Journal, Transportation in Engineering Journal and part of the Advisory board of the Applied Thermal Engineering and Progress in Energy and Combustion Science Journals.

Abstract: Synthetic fuels have become an important way of reaching carbon neutral utilization of hydrocarbon-based fuels in the internal combustion engines. Specifically, poly-oxymethylene dimethyl ethers (OMEx) have demonstrated great advantages to reduce NOx emissions below the EU VI homologation normative while maintaining ultra-low soot emissions with a great benefit in CO2 emissions on a well-to-wheel basis. Nonetheless, the properties of these fuel in single-fuel combustion strategies are not thoroughly investigated in the literature. Thus, this presentation aims to show the potential of OMEx fuel under conventional combustion modes. To do this, an experimental characterization under different experimental tools is presented. In particular, a high pressure high temperature vessel with full control of thermodynamic conditions and a single cylinder CI engine under two different versions, optical and metal, were employed. The flame structure as well as the soot production were analyzed by applying different high-speed imaging techniques: natural luminosity, OH*, flame spectroscopy and 2-color pyrometry. In this sense, the presentation summarize the OMEx behavior from an isolated spray without sprays and swirl interaction until a real bowl & multi-nozzle engine environment showing its benefits and drawbacks.

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